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33

CACTUS AND SUCCULENT JOURNAL

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Sedum morganianum spec. nov., as cultivated at
Coatepec near Jalapa.



CACTUS AND SUCCULENT JOURNAL

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ANNUAL MEETING

Sunday, October 9, 2:30 p. m., at Frank Mark's residence on top of Mt. Washington. Picnic supper and an opportunity to view a fine collection of cacti growing above the clouds! See windows of a glasshouse that open and close automatically. See what can be done by an amateur in two years. Those unfamiliar with the location may meet at Pres. Marshall's, 327 N. Ave. 61 and be escorted under heavy guard to the Mark stronghold. Members Tegelberg and Johnson are scheduled to tell all they know about cacti. Mark your calendar NOW. No further notices will be sent.

BOOK REVIEW

Guide to the Succulent Plant Collection of the Missouri Botanical Garden by Ladislav Cutak. 32 pages 6x9, 9 illustrations. 25c (Address the Librarian, Missouri Botanical Garden, St. Louis, Mo.)

One of the finest contributions of the year is this informative booklet by one of our Society members. Not only is the contents a guide to Garden, but it clarifies the plants spoken of as "Succulents."

The Garden itself contains one of the largest collections under glass in America—well over 1,000 species of mature plants. It is gratifying to know that plants donated to this institution are properly grown and recorded.

The booklet tells in simple language the qualifications of a succulent and lists the families having succulent qualities. The following families are described and followed by listings of many of the species:

Asclepiadaceae (Milkweed Family) includes *Stapelia*

Amaryllidaceae (Amaryllis Family) includes *Agaves*

Euphorbiaceae (Spurge Family) includes *Euphorbias*

Liliaceae (Lily Family) includes *Aloe*, *Haworthia*,

Yucca, etc.

Crassulaceae (Orpine Family) includes *Echeverias*,

Crassulas.

Cactaceae (Cactus Family) includes many genera.

The stability of the Garden is proven in its use of Britton and Rose nomenclature. An institution of this kind cannot accept every new name which only undergoes another change tomorrow.

Aizoaceae (Fig-marigold Family) includes Mesembs. Miscellaneous Families include *Portulaceae*, *Compositae*, etc.

Non-succulent Desert Plants include an interesting list such as *Fouquieria*, *Idria*, *Parkinsonia*, etc. Amateur and advanced collectors will derive useful information from this booklet.

The author is making a collecting and photographing trip to Texas and the Big Bend region as well as the Lower Rio Grande Valley. His main objective is to photograph plant life and scenic features for use in

lectures. Mr. Cutak is one of the dozen men who are educating the public in succulents. May his good work continue.

PRONUNCIATION OF "CACTI"

In the *Glossary* why did you omit the pronunciation of 'cacti'? I read once that the Society preferred 'Cacte,' but my dictionary gives long 'i' preferred. Also I am hoping that sometime soon you will give the pronunciation of the double 'i' ending. This *Glossary* is just what a lot of us have been wanting for a long time.

MRS. HARRY LEWIS.

Replying to your inquiry, the word "cacti" is pronounced with a long "i" in English. I think any English language dictionary will give it that way; I have checked Webster's and Century. In specific names ending in "ii," the accent is on the syllable next preceding this ending, the first "i" is short and the second is long.

ROBERT S. WOODS.

WANTED STAPELIADS

Trichocaulons, *Hoodias*, *Huernias*, *Huerniopsis*, *Echidnopsis*, *Duvalias*, *Tavaresia*, *Piaranthus pallidus*, *Stapelia ramosa*, *Luckhoffia beukmaniae*.

J. E. GILKEY
1625 N. W. 29 St., Oklahoma City, Okla.

"CACTI" BY PROF. BORG

We recently published an excellent book, *CACTI*, by Borg. Perhaps you have seen it. It contains one of the most thorough lists of varieties that I have seen in any book on the cacti, apart from Britton and Rose. And, being new, it includes all the developments which have superseded certain parts of Britton and Rose's enumeration. Borg's book is also beautifully illustrated. Price \$7.50.

THE MACMILLIAN COMPANY.



Sedum morganianum spec. nov., as cultivated at Coatepec near Jalapa.

Notes on Crassulaceae

By ERIC WALTHER, Botanist, Golden Gate Park

Sedum Species, New and Old

Incidental to the writer's studies in the genus *Echeveria*, numerous questions arose as to the exact identity of species belonging to the several allied genera, as well as their correct allocation. In various previous issues of this *Journal* we have reported on our findings in *Pachyphytum*, *Graptopetalum*, *Villadia* (*Thompsonella*) and *Altamiranoa*, and today propose to extend our survey into the genus *Sedum*. With well over 500 species known, this is easily the largest, and perhaps most unwieldy, genus of the family. Naturally we hesitated long before adding further to this great mass of species, for it is only too easy to overlook a previously described species, particularly since many of these were poorly characterized. However, careful perusal of such excellent works on the genus, as R. Lloyd Praeger's *Account of the genus Sedum*, or Dr. Harald Froederstroem's *The Genus Sedum*, left no doubts but that several of the plants collected by us in Mexico or previously cultivated in the various collections of California's succulent-fanciers were undescribed forms, and certainly deserve to be placed on record.

All of these forms are of Mexican origin, most of them having been collected by us during our Mexican field trips in 1934, 1935 and

1937 and are now growing in the botanical collections of Golden Gate Park, San Francisco. The most remarkable of these novel *Sedum* species has already been pictured in these pages, but merely under its vernacular name "Cola de Burro," or "Donkey's Tail," which is indeed a most apt appellation in view of its long-trailing branches, which with their thickly turgid, silvery white, easily detached leaves serve to make this plant one of the most unusual and ornamental succulents.

Sedum morganianum spec. nov.

Planta suffrutescens; ramis procumbentibus gracilibus; foliis crassis, subteretibus, ad 20 mm. longis et 8 mm. crassis, oblongo-lanceolatis, acutis, falcatis, albido-viridulis; inflorescentis terminalibus, subcymosis, 10-15-floribus; pedicellis longissimis, ad 30 mm. longis; sepalis erectis, vix patentibus, 8-9 mm. longis; corollis 5-meris, campanulatis; petalis liberis, erectis, tenuibus, deltoideo-lanceolatis, acutis, ad 11 mm. longis, rosaceis; staminibus 10, 6-7 mm. longis; carpellis erectis, 7 mm. longis, rubris; stylis patentibus super; squamis late reniformibus, 1.3 mm. latis, 0.8 mm. altis.

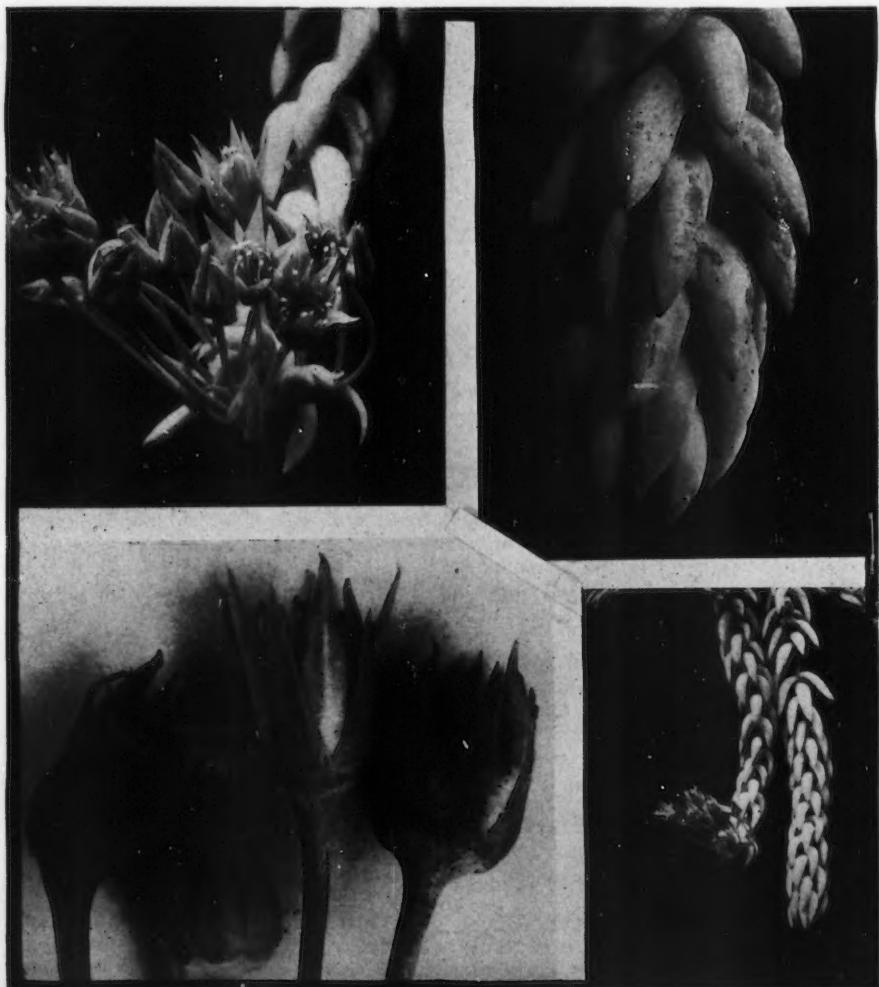
Type: California Academy of Sciences Herbarium No. 256235. (E. Walther 35/23.)

Locality: Cultivated in nursery at Coatepec, near Jalapa, State of Vera Cruz, Mexico.

Plant an evergreen subshrub; *Branches* long-trailing or procumbent, arising from near the base of the older

ones, stems slender, 4-6 mm. thick; Leaves many, but most readily detached, thickly-fleshy and turgid, subterete, somewhat flattened above, appressed to spreading, usually falcately decurved near base, oblong-lanceolate, acute, approximately 20 mm. long by 8 mm. thick; color light-grape-green to water-green, glaucous-pruinose; Inflorescence terminal, cymose-racemose, of 6-12 flowers which appear only on old, mature specimens; Upper bracts few, subulate-filiform, falcate, about 10 mm. long by 1 mm. thick, broadest at base; Pedicels exceptionally long and slender, to 30 mm. long or more, with a thickness of scarcely more than 1 mm., erect or strongly ascending from the drooping tip of the flowering branch; Sepals erect to appressed, nar-

nowly deltoid-lanceolate, flat, acute, 8-9 mm. long, strongly connate at base into the turbinate thickened apex of the pedicel, colored as the leaves; Corolla 5-parted, subcampanulate, its petals free to base, ascending, only slightly spreading at the tips, thinnish, faintly keeled on back, deltoid-lanceolate, acute to acuminate, to 11 mm. long, color begonia-rose, scarcely or not hollowed within, but there showing numerous fine, longitudinal red lines; Stamens 10, slightly longer than carpels, but shorter than petals; Anthers ovate; Carpels erect at anthesis, slender, to 7 mm. long, color carmine to eugenia-red; Styles slender attenuate, strongly incurved at tips; Stigmas minute, yellowish; Nectaries broader than high, 1.3 mm. wide by 0.8 mm.,



UPPER LEFT: *Sedum morganianum* spec. nov.; inflorescence, app. x 0.9. UPPER RIGHT: Sterile shoot, app. x 1.4. LOWER LEFT: Flowers, app. x 3. LOWER RIGHT: Sterile and flowering shoots, app. x 0.25.

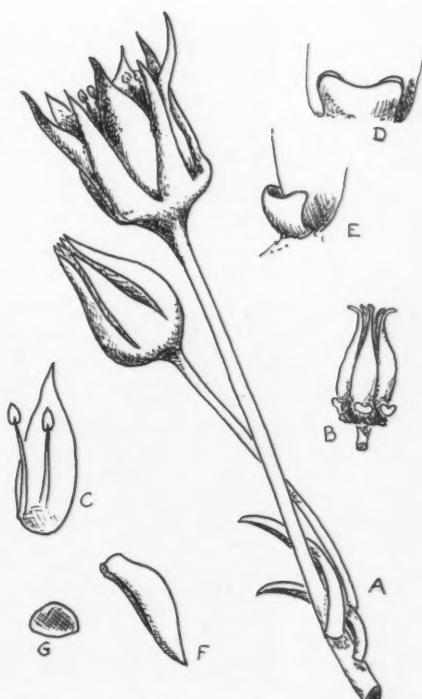
emarginate, ascending, colored as the carpels, but somewhat paler, secreting an abundance of nectar; ripe follicles and seeds as yet unknown.

Remarks: Before concluding that this was really an undescribed species, it had to be carefully compared with a number of others, very imperfectly known species from Mexico. Of these Mexican species, the one most closely resembling the present one is apparently *Sedum allantoides* Rose, which differs quite clearly in its erect habit, the stouter branches, quite blunt leaves, paniculate inflorescence with more numerous flowers, shorter pedicels, shorter spreading, whitish petals, white ovaries, etc.

In its red carpels this new species recalls *Sedum rhodocarpum*, collected on our last trip to Mexico near Monterey, the type-locality; but that species is quite distinct with its angular stems, ternate, thin leaves and wide-spreading petals. *Sedum treleasei* and *S. pachyphyllum* of Rose have a lateral inflorescence and yellow flowers, *Sedum adolphi* Hamet also has a lateral inflorescence and white, stellate flowers, while the imperfectly known *S. botteri* and *tortuosum* of Hemsley are both stated to have shortly-stalked flowers. *Sedum oxypetalum*, *retusum* and *frutescens*, three species with white or pinkish flowers, have thin leaves borne on erect stems.

Our first meeting with this unique species was a memorable occasion of our 1935 trip to Mexico, during which we visited Jalapa in our search for *Echeveria racemosa*. The nearby town of Coatepec, center of the local coffee-growing district, was easily reached by gasoline-trolley; while there waiting for our local guide we fell into the hands of a most aggressive street-urchin, who literally dragged us into the sales-yard of what turned out to be a small nursery with the flamboyant name "Jardin Flotante." This appeared to be run by the gamins father, and its most interesting item immediately caught our eyes, being this new species here described. It was being grown in numerous tin cans, attached to one side of the house wall, which was lost to sight under a dense curtain of cascading stems, as shown in our photograph. That we quickly purchased several plants may be taken for granted. Later that same day we found this again, under the eaves of a small coffee-planters shack, and once more at the famous gardens at Banderilla.

Nothing could be discovered as to the natural habitat of the plant nor its flowering habits. It so remained a mystery for over three years, for nothing we could think of doing would induce



A. *Sedum morganianum* spec. nov.; single flower and bud, x 2.5
 B. Carpels, x 2.5
 C. Inside of petal, x 2.5
 D. & E. Nectary, x 10.
 F. Single leaf, x 1.
 G. Leaf in cross-section, x 1.

our plants to bear flowers. Finally our friend Dr. Meredith Morgan of Richmond, California, managed to induce his fine specimen to bloom for the first time in the U. S. to our knowledge. At the very lowest end of its longest trailing branch, nearly 3 feet in length, this bore its first cluster of flowers, enabling us to decide that this puzzling item was indeed a member of the *Crassulaceae*, belonging to the genus *Sedum* and had not been previously described or named. We take pleasure in recognizing in its specific name the skilled cultivator first bringing it into flower.

Sedum morganianum should become a popular basket-plant, for not only is it a truly unique and most decorative item particularly suited to this type of cultivation, but the extreme readiness with which it may be increased by means of the detachable leaves destined it to become widely distributed and quite common in a short while.



Espositoa lanata, E. sericata and Hybrids

By CURT BACKEBERG

Translated by Dr. R. W. Poindexter

The genus *Espositoa* was set up by Britton and Rose in 1920, and based on *Cactus lanatus* HBK (Nov. Gen. et sp. 6:68, 1823), collected by Humboldt and Bonpland near Guancabamba in the state of Quito, fruit locally called "piscoles." It occurs also along the nearby Aranza River.

In regard to the geographical reference it may be said that the early Spaniards had difficulty pronouncing the word "Huancabamba" and therefore wrote "Guancabamba," as they did also with other Indian words in the Quetchnua language, such as Guanaco and guacos. This is the reason for two names covering the type locality. (There is, by the way, a second Huancabamba in eastern central Peru.) The territory anciently known as Quito is still claimed by Ecuador, but now belongs to Peru.

The Huancabamba River is a tributary of the Marañon. The town of Huancabamba can be reached by a traveler coming from Ecuador via

Cuenca, Loja, but it is a very tiring ride. For this reason, (as is stated in Br. & R., Vol. II, Page 61) Rose sought in vain to reach the original type locality given by Humboldt. Rose then collected plants in Catamayotal in southern Ecuador and from these he made his additions to the original description.

I call attention at this point to my illustration, which shows Humboldt's type locality. A comparison with Rose's illustration (Br. & R., Vol. II, P. 61) showing staghorn branching in the specimen from Catamayotal depicts an unusual form of growth (variety?). Rose then merged with this plant the white-haired plant which he discovered in central Peru. A later discussion will go into the details of this matter, since many misconceptions, errors, and renamings have occurred with respect to this species which may make it necessary to declare Rose's *Binghamia* a genus ambiguum or genus confusum.

At any rate the much lower-growing central

Peruvian plants are something entirely different. Through the confusion in characters which Rose brought into his description have arisen the following citations on the length and color of the central spines of *Espostoa lanata*: "radial spines numerous, acicular, 4 to 7 mm. long, brownish, intermixed with long white hairs; central spine solitary, yellow or brown to black, subulate, 2-5 cm. long."

Brown to black central spines occur only on the central Peruvian plant which Rose considered identical with *E. lanata*. *E. lanata* on the contrary, has white to yellowish, fine, glassy-transparent, numerous radials, and central spines which are yellowish-white with reddish tips.

The radials vary to diminutive spinelets of a pronounced red. The central spines often have a long tip and are occasionally marbled with red. *E. lanata* is a plant distinguished by central spines up to 10 cm. long.

Espostoa sericata (*Cereus lanatus* subspecies *sericatus* of Werd. and Bckbg.) is without visible central spines. The accompanying photograph shows *E. sericata*.

According to my theory of evolution, we are particularly concerned with the district of southern Ecuador and northern Peru which forms a dividing line between the "southern" and "northern" centers of development. The merging of the two may be seen in southern Columbia where a *Mammillaria*, (*M. bogotensis*), whose affinity with the northern group cannot be doubted, associates with *Frailea columbiiana*. Fraileas are otherwise native only in Paraguay and Uruguay, and their adherence to the southern group is equally certain.

A third group of cacti in this same region is represented by *Espostoa* and *Thrixanthocereus*. Here, on account of favorable climatic conditions, there still remains a residue of the vast *Cereus* distribution which in ancient times extended clear to eastern Brazil, across the territory now occupied by the primeval forest of the Amazon. This residue is found around Huancabamba and southerly to Huancayo.

This high stage of evolution is only conceivable with the assumption of a long period of development. The former Brazilian region of distribution of *Cephalocerei* must be older than the southern region of distribution of *Cerei*. In this long period of time we may assume that the following has occurred. Around Huancabamba many species must have been developed—white-spined ones, yellow-spined, red-spined, and so on; those with long central spines and those without. As climatic conditions became more adverse, the crowding of the different species

must have resulted in a complete hybridization. The same reasoning applies to the Chilean occurrence. These represent real "cactus islands." In Chile also the same "dispersion of varieties" is visible, which enormously increases the difficulty of making separations.

From the beginning, therefore, I have applied the following method: I have considered the derivation to be from assumed former types and have picked these out from the enormous complexity of transitional varieties which we now have before us. Perhaps we shall later have to introduce sub-varieties in order to clear up the situation; without their use we may not be able to clarify the Chilean situation completely. By using this principle I recognized at Huancabamba two strongly differentiated species with abundant examples of each: *Espostoa lanata* with long central spines (and the frequent occurrence of reddish spine-color) and *E. lanata* without any recognizable central spines, and always pure white to light yellowish radial spines. These two I have separated as good species. In between there are many very beautiful hybrids, some of which show splendidly marbled, horn-colored spines.

It should also be pointed out that the hair of these *Espostoa*s is translucent, loose, and silky, in contrast to the central Peruvian *pseudo espotoa*, which has dull, cottony, and matted hair. The *Espostoa*s become as high as 5 meters, the central Peruvian plants 2 meters at the highest. The fruit of the *Espostoa*s is carmine red, that of the central Peruvian plants white. The cephalium of the *Espostoa*s arises from within a deep furrow in the stem while that of the Peruvian plant is an external cephalium, similar to that of *Cephalocereus Dybowskii*. The cephalium wool of the *Espostoa* is dug out and used for a filler for mattresses.

As I said already, Rose did not succeed, because of the difficulties of the mountain road, in getting from Ecuador to northern Peru, but the collector Roezl must have made this trip, for he introduced *Cereus Dautwitzii* as coming from Huancabamba. It's exactly the same as *Espotoa*, though a description was never published. In view of the wide variation of the plant, it is no longer possible to determine which of the two species, now bearing the name of *Espotoa*, Roezl really intended to have covered by the nomen nudum *Cereus Dautwitzii* of Haage. That name is therefore invalid.

On the other hand, I have been able to retain this name and give recognition to the long-forgotten, but outstanding activities of Roezl as a collector. (See later remarks under *Boracicactus*.)

Since Roezl had previously collected in Ecuador, he must have succeeded in making the trip from Cuenca to Huancabamba at that time. In 1931 I showed for the first time that the most convenient route to Huancabamba is the pass over the northern Peruvian Andes. In 1931 I had to ride horse-back the entire distance, and getting the plants out was very difficult indeed. In the meanwhile the construction of automobile roads on both the eastern and western sides of the pass has been started, so that an auto truck can already be used in places. In the interval, Blossfeld, Jr., has followed me. On a recent trip I was able to transport gigantic cristates for Mr. Morawetz, such as the one I show in the illustration to this article. This time I had to find a new kind of transportation for these large plants—manpower. In this manner I was successful for the first time in the history of cactus collecting in bringing full-sized plants over the Indian passes from the eastern slopes.

The illustration shows not only an outstandingly beautiful crest (now in my private collection), but also that the cephaliums are all formed on the northern sides of the stems (from northeast to northwest). Especially unusual is the form of the highest stem. It shows two cephaliums on one stem. Such a case has never been known hitherto. The picture also shows clearly the furrow or depression in the crown of each stem just above the top of the cephalium. It is out of this depression that the addition to the upper end of the cephalium takes place as growth continues. The picture also shows that the branches are always erect and not spreading sidewise as in Rose's picture from Catamayo.

Euphorbia is not only one of the most beautiful of cacti, but also one of the most remotely situated and therefore rarest. It grows slowly and is very resistant to cold. If one is not in a hurry, it is by no means necessary to graft, as it grows very well on its own roots.

By repeatedly cutting off the tops of seedling plants, it is possible to produce beautiful "miniature plants" which are exact replicas of the original.

CACTUS SPINES

A rose has its thorns and a cactus its spines. Much as we admire our plants they can and do at times become very annoying when one comes in contact with their spines. If one happens to get good sized spines in one's fingers it is an easy matter to remove them with a pair of tweezers, but when it comes to those fine, almost invisible spines (glochids), well, that is another story.

One day while re-potting some cacti I managed to acquire quite a collection of these fine spines in my fingers. After trying for about half an hour to remove them I decided the only thing to do would be to wait

for them to eventually work themselves out.

Later that day I had occasion to do a little plastering job about the house; while engaged at this task I got some of the plaster of Paris on my fingers. The plaster dried and prior to washing my hands I started picking it off and discovered that the spines came out with the dried plaster. So, dear friends of cacti, if you wish to remove these pesky little spines make a thin paste of plaster of Paris, coat the affected parts with it; let dry thoroughly and pick off the plaster. Presto—out come the spines.

A. W. V., Brooklyn, N. Y.

How Can One Import Plants?

Your request of February 2, 1938, for a statement regarding the entry restrictions on cactus and succulent plants, has been received.

The term "cactus and succulents" is here used to refer to cactus plants and those succulents commonly grown in association with cactus plants in collections of cacti and succulents.

The entry of these plants is restricted by the provisions of regulation 14 of Nursery Stock, Plant, and Seed Quarantine No. 37. Applications for permits to import the plants are made on Form EQ-207, copies of which are furnished the applicants upon the receipt of their requests.

Shipments of cacti and succulents may be authorized entry under permit of the following ports in the continental United States: Washington, D. S.; Brownsville, Laredo, and El Paso, Texas; Nogales, Ariz.; Calexico, San Ysidro, San Diego, San Pedro, and San Francisco, Calif.; and Seattle, Wash. Regulation 7 of the quarantine requires that shipments of plants shall be free from soil when offered for entry. Inspection of the importations is made at time of entry to determine their apparent freedom from plant pests. If pests are found, appropriate treatments are required. It is, therefore, to the interest of the importers to arrange that their importations shall be offered for entry free from pests.

Importations of this class of material need not be held for the customary 2-year period before distribution and paragraphs 7 and 8 of the special permits covering the delayed release feature are waived with respect to importations of cacti and succulents.

It is believed that the foregoing information is that which you desire but, if there are any additional points on which you wish a further statement, please let us know.

LEE A. STRONG,
U. S. Dept. Agriculture, Washington, D. C.

MESEMBRIANTHEMEN UND PORTULACACEEN

by A. Berger. \$3.00.

STAPELIEN UND KLEINNIEN (German)

by A. Berger. \$3.00.

The following 8 pages are the 6th and 7th installments of the Illustrated, Pronouncing Glossary.

What Is New in Huntington Botanical Gardens

By WILLIAM HERTRICH, Curator Huntington Botanical Gardens

San Marino, California

Visitors of the Huntington Botanical Garden are frequently impressed by the flowering shafts produced by various species of the genus *Agave*, commonly known as "Century Plant." These plants are the subject of many questions, especially when in flower. Many wish to know their native habitat, hardiness and commercial value. Those interested in possessing such plants ask for cultural directions. The age at which the century plant flowers, and length of the flowering period, are the two questions most frequently asked.

In answer to the first question (the native habitat) we might state that *Agaves* are strictly American plants. The majority are native to Mexico where many of the largest and most imposing types are found. Practically all Mexican species are hardy enough to be used out of doors in Southern California, or in other countries of similar climate. Slightly less hardy are some species indigenous to Central America and the West Indies, and this is also true of the few species found in the northern part of South America. Many of the smaller and medium sized types are found in southwestern United States, including Utah.

About 300 species and varieties have been described. They range in size from plants a few inches high, as *Agave parviflora* whose shaft is the thickness of a pencil and is from 2 to 3 feet in height, to the giant *Agave americana* types with towering shafts from 6 to 8 inches in diameter which extend 30 feet into the air.

In view of this great variation in size and shape, these plants have many ornamental uses. They may be planted to advantage on hot, dry, barren hillsides and slopes where scarcity of water is a factor, or in places where rugged design and variation in color is desired. Their

coloring ranges through various shades of green, gray, and even bluish-gray. Some species form huge plants supporting forty or more leaves, from 4 to 6 feet long, about a foot wide and from 4 to 6 inches thick at the base. Then again some are small symmetrical, compact types whose entire body is only about a foot or less in diameter. Many of these smaller plants are ideal for formal gardens as they can be kept in containers for several years. Others are most appropriate for rock garden planting.

Agaves, in most instances perpetuate themselves. Some species produce sucker shoots. Others form bulbils on the flowering stock which assume the shape of young plants, having partially developed leaves and roots; these sometimes remain alive on the flower stalk for more than a year. They finally fall to the ground and under favorable conditions take root and become established plants. Most species, however, produce an abundance of seed from which plants are very easily grown.

Many economic uses are attributed to the *Agave*, some of great importance to the native population. Certain species in southeastern Mexico produce an excellent type of sisal. At the turn of the twentieth century these species were cultivated extensively in southeastern Africa for the production of commercial sisal and plantations exist today on the island of Hawaii. Several species of the larger types of *Agave* are grown in the central Mexican plateau and form the source of a drink known to the natives as pulque. In other sections of Mexico smaller types of *Agaves* are cultivated commercially for the production of mescal or tequila, a drink obtained through a distilling process. Many natives plant *Agaves* as hedges for they form very effective barriers against unwanted intrusion.



January 2, 1938 — 13 in.



April 1, 1938 — 5 ft. 10 in.



June 1, 1938 — 8 ft. 7 in.



August 1, 1938 — 10 ft. 9 in.

Agave polyacantha Jacobi—measurement of shaft and raceme above leaves.

To produce the flowering shaft, most *Agaves* take from 8 to 15 years, dependent upon the species, type of soil, and climatic conditions. In one or two species the plant is twenty years old before the flowering shaft appears, even under favorable conditions. The first indication that the plant is about to flower is a shortening of the central leaves. This may be noticed over a period of several months before the heart begins to expand; finally the top of the young shaft protrudes from the center leaves. When in bloom the plants attract bees in great numbers, as well as various species of humming birds, for great quantities of nectar are found in the throat of the flowers.

Agaves have been cultivated in Europe for a great many years. They were introduced from the West Indies by early Portuguese and Spanish explorers and were known to them as "Maguei." As early as 1553 mention was made of them by Peter Martyr in *De Rebus Occ. et Orbe Novo*. They were also mentioned by other early explorers such as Ovieto, and F. Lopez de Gomara in 1556. However, an Englishman, Jon Gilton, while traveling through South America and Mexico, first noticed the various uses made of this plant. He wrote of the Maguei as yielding wine, vinegar, honey and black sugar; hemp was produced from the dried leaves for making rope. He also mentioned the production of pulque.

Records indicate that as early as 1583 *Agaves* produced flowers in Europe, and they are frequently mentioned thereafter. In certain sections along the Mediterranean coast some species have naturalized themselves, which is also true, to a lesser extent, in a few other countries.

The accompanying illustrations of *Agave polyacantha* Jacobi and *Agave atrovirens* Karwinsky show photographs taken at intervals during the development of the flowering stock and during the actual flowering period, indicated by the dates below each photograph.

The flowering stock of *Agave polyacantha* began to form about November 1st, 1937, while the first sign of flowering in *Agave atrovirens* was noticed about September 1st, 1937.

After the flowering period is over and seed or bulbels have formed, the shaft remains in an upright position for some time. Seed matures from two to three months following the pollination of the flowers. From six months to a year elapses before the flowering stock, as well as the plant itself, finally leans over and falls to the ground due to wind pressure or other causes—thus ending the life of a "Century Plant" at an

age considerably short of what this common name of the *Agave* erroneously implies.

The following data regarding the age, at the time of flowering, of the two species illustrated might be of interest to the readers of this article. Two plants of *Agave polyacantha* were originally received and planted in the garden in 1931 when they were about three years old. One of these specimens started to produce a flowering stock in November of 1936 and this reached a height of 18 inches when the freeze of January, 1937, injured the terminal and interfered with its further development, but without injury to the plant itself. At this time, August 1st, 1938, this same plant is producing multiple heads from the heart instead of from its base as is usually the case.

The illustration, however, is of the second plant received of *Agave polyacantha* at the same time. This specimen produced its flowering stock one year later than the one injured in the frost which indicates that the plant was ten years old at the time of blooming.

Agave atrovirens, also illustrated, is the first to bloom of six plants set out in 1928. This plant was propagated from a side shoot and was about twelve years old at the time of flowering.

These two specimens have possibly developed above average size because of ideal soil and other favorable conditions. The following dimensions and comparative heights of the flowering shafts may be of interest to readers of this Journal.

Agave polyacantha, a fully developed plant, ready to send up its flowering stock measured 28 inches in height by 39 inches in width, November 1st, 1937. Illustration number one represents this plant on January 2nd, 1938, showing top of shaft 13 inches above leaves. Number two is a photograph taken April 1, 1938, when shaft had grown to 5 feet, 10 inches. On May 15th the first flowers opened and by June 1st, 1938, the third measurement recorded the shaft 8 feet, 7 inches high. August 1st, 1938, practically terminated the flowering period of this specimen, when the shaft had reached a height of 13 feet, 1 inch above ground and had produced 2,733 flowers. The life cycle of this plant from seed to maturity may be counted as ten years, plus ten months for the development of shaft, flowers and seed.

The flowers of *Agave polyacantha* are arranged in small bunches around the upper portion of the shaft (8 feet, 3 inches) in such a manner as to form a complete circle. The number of flowers per lineal foot, per bunch, varies somewhat according to their position as the following table shows:



November 1, 1937 — 35 in.



April 1, 1938 — 9 ft. 8 in.



May 15, 1938 — 12 ft. 4 in.



August 2, 1938 — 20 ft. 4 in.

Agave atrovirens Karwinsky—measurement of shaft and inflorescence above leaves.

First foot produced.....	212 flowers arranged in 21 bunches.
Second foot produced.....	278 flowers arranged in 34 bunches.
Third foot produced.....	221 flowers arranged in 47 bunches.
Fourth foot produced.....	325 flowers arranged in 58 bunches.
Fifth foot produced.....	365 flowers arranged in 68 bunches.
Sixth foot produced.....	463 flowers arranged in 91 bunches.
Seventh foot produced.....	514 flowers arranged in 100 bunches.
Eighth foot produced.....	331 flowers arranged in 104 bunches.
Terminal—3 in. produced.....	24 flowers arranged in 24 single flowers.
Total.....	2733 flowers.

Slightly less than 1% of these flowers produced seed capsules. Consequently, figuring at an average of 14 seeds per capsule, 26 capsules produced about 364 seeds.

Agave atrovirens, a fully mature specimen as of April 1st, 1937, measured 7 feet, 10 inches, in height by 14 feet, 3 inches, in breadth. Height of the shaft on November 1st, 1937, was 35 inches above top of leaves. By April 1st, the shaft was 9 feet, 8 inches high, and 12 feet, 4 inches high, by May 15th. The maximum of 20 feet, 4 inches, was reached on August 2nd,

1938. Flowers were borne on the upper 9 feet, 4 inches, and there were 12,107 borne on the 22 branches. One of the largest of the lower branches carried 697 flowers while the terminal and the two smallest top-most branches together carried 260 flowers. The production of seed capsules set along the lower branches as of August 2nd, amounted to 4.5% of the flowers produced. If this same ratio is maintained, 539 capsules can be reasonably expected. Figuring on an average of 25 seeds per capsule, based on an examination of 15 capsules, a total of 13,600 seeds will be produced.

MAGAZINE REVIEW

Kakteenkunde for August, 1938

Your reviewer is greatly interested in the first article, which is an original description of *Wilcoxia tamaulipensis* by Dr. Werdermann. This interest is only natural for the reason that the Nomenclature Committee of our Society had the plant under discussion at a recent meeting. The consensus of opinion was that it shows sufficient differentiation from *W. Poselgeri* to constitute a valid species, although your reviewer registered a minority dissension from that view, holding it to be a variety of *W. Poselgeri*. At any rate our Committee is glad that the plant has been published and agrees with Dr. Werdermann that it is desirable to publish new discoveries especially when they are already in circulation among collectors. The plant was first called to my attention by Dr. W. E. Lowry in a letter dated August 18, 1935, in which he says, "I am sending in lieu of *W. papillosa* a small cut of a new *Wilcoxia* which I intend to publish as *W. tamaulipensis*. It is very similar to *W. poselgeri*, but has a very different spine arrangement. Publication has been held up until I have an opportunity to see the flower." Dr. Werdermann agrees with Dr. Lowry that the spination constitutes a principal difference from *W. Poselgeri* and also calls attention to the thicker stems, and his picture shows a less widely opened flower, with narrower and paler petals than *W. Poselgeri*. To me, the most striking difference is the fact that the ovary of *W. Poselgeri* is extremely woolly while in *W. tamaulipensis* it is practically free from wool, though very spiny. *W. tamaulipensis* has flowered for me with flowers identical with those of *W. Poselgeri* in size, shape, form of petals and color, the only difference being the covering of the ovary just mentioned. The difference in petals observed by Dr. Werdermann may be accounted for by cultural conditions or may be inherent in a variable species.

The August front cover illustration is a microphotograph of the skin of *Cereus Huntingtonianus*, which is probably Mr. William Hertrich's favorite *Cereus*. This illustration is repeated under the section on microscopy in the current installment of *The Cactus Grower's Encyclopedia*.

W. von Roeder reviews a book by Dr. Otto Porsch on the flowering and pollination of cacti with special

reference to the manner in which pollen is transported by birds and insects.

The current installment of *What's New in Mesems. and Other Succulents* is even larger than usual, containing more new species.

REVIEW

Alberto Castellanos, in a pamphlet published in Buenos Aires in 1937, points out that the genus *Hickenia* was erected by Lillo in 1918 in the family Asclepiadaceae. The author therefore considers *Hickenia* Br. & R. 1922 invalid as a genus of Cactaceae. Species described under this name should be transferred to the genus *Parodia*.

R. W. P.

QUESTIONS

Column conducted by E. C. Hummel

Question: Is it possible to produce albino plants without green coloring matter, and crests, with radio-active soil? H. J.

Answer: Radioactive soil may be sufficient to cause albinism or fasciation. I believe, however, research on files at a Texas university credits mutation, which covers both items, could be caused by prolonged heat or cold. Naturally to eliminate these as a cause, a neutral temperature would have to be maintained.

Question: Will you describe the nematode fungus, insect or disease. W. C. N.

Answer: You have, no doubt, learned from Mr. Gates' article on "Benching," in the June *Journal* that nematode is not a fungus. It is a disease caused by invasion by a microscopic worm into the roots of your plants. Its presence is manifest by formation of knots or galls which are more conspicuous on some species than others, but are plainly visible on all infected plants. In the body of the plant the first evidence other than general ill-health, are symptoms very similar to nitrogen poisoning. This disease is one that every collector or cacti and other succulents should make every effort to keep from getting a start among their plants. As long as we have crickets, tree frogs, sparrows, etc., it is never safe to take an infected plant onto the premises, as contact with infected soil and later with your uninfected pots can easily spread this enemy. Sparrows dusting themselves in contaminated gardens even some distance away and later repeating the process

among your plants makes it clear that one must be on the look-out at all times for evidence of the presence of nematode. Your best friend who loves to feel your newly mixed soil may leave enough infection to make it dangerous to use. Testing for moisture with a soiled stick or fingers is also dangerous. A better way is to observe the plant itself or by thumping the pot from the outside.

For cacti which are in pots the method of cure is simple. Take the plant from the pot and remove every vestige of roots. The soil and pots must be sterilized by boiling or baking for at least one hour, or other effective methods. Every particle of contaminated soil must be removed from the plant, which may be done with the garden hose. The plant may then be rerooted and while this process may seem drastic and will set the plant back much in growth it has proven very satisfactory and the growth of a healthy plant makes it well worth the effort. We suggest everyone, whether bothered with this disease or not, write to the University of Agriculture at Berkeley, California, and request Circular No. 330, *The Root-knot Nematode*.

FLOWERING CACTI IN SEATTLE, WASHINGTON

EDITOR'S NOTE: In the Sept., 1937, JOURNAL, page 43, Mrs. Lewis tells how she grows her plants in boxes. In this same issue is a summary of an exhibit in Seattle. Mrs. Lewis again broke into print in "Better Homes and Garden" and helped to publicize the Society more than any one individual since Dr. Houghton's "Cactus Book." We are grateful for her notes in this issue and are deeply appreciative of her work to further the interest in cacti.

Jan. 26, 1938.

In naming my ten favorite cacti, I would select those that have flowered best for me.

I like *Mammillaria kewensis* because it flowers six months of the year, starting in mid summer. *M. perbella* is another attractive one because of its small neat appearance and bright flowers.

Echinocereus reichenbachii has flowered unusually well for me as has a mature plant of *Astrophytum myriostigma*. Both of these are in bloom by May 15; the latter sends up one bloom at a time as long as the weather is warm and sunny and buds that do not mature one year hold over until the next.

Chamaecereus sylvestrii is another that starts about May 15th, and flowers for about two months. An accident to this plant and also to *Aporocactus flagelliformis*, I think taught me something last year. I had never been able to flower them so I grafted them onto *Opuntia* stock and they grew so fast that the stock died. So from late summer until spring they had no roots and naturally withered until I didn't think there was any life in them. Rather than throw them out I cut off the *Opuntia* stock and staked them into dry leaf mold and left them in a sunny south window and forgot about them. Early in February the Rat Tail budded heavily and by April 1, was in bloom. I began watering as soon as they showed buds and when I transplanted

them in July both plants had made heavy root growths. I believe often the failure to flower cacti is because they are not rested hard enough.

Rebutia minuscula is another plant I enjoy. A plant only an inch in diameter, ungrafted, had 12 fine flowers last year. This flowered about March 10. *Notocactus baselbergii* blooms in May and is a beautiful plant in or out of flower. This is grafted on *Piplantocereus* stock and by the way, this is the most successful stock for me. It stands rich soil and quite a lot of forcing.

I would have to include *Hamatocactus setispinus* because it is a heavy and reliable bloomer, not only for me, but for several friends. I hesitated about adding *Phelosperma tetrancistra* because I have heard that it is so hard to grow successfully, but plant and flowers are so attractive that I shall include it. Perhaps the reason I have been successful is because I brought home some soil from California that it naturally grows in—a coarse decomposed granite, and I have never given it much water. It flowers in June.

There are several others that have flowered consistently for several years for me. *Mammillaria cephalophora* and *M. erythrosperma* in early March and they are both fine. *M. hemisphaerica* and *M. microbelia* flower in May and are very attractive.

In May and June nearly all of the Texas *Echinocereus* flower. I had quite an interesting experience with one I have identified as *E. baileyi* because of its buff spines. An army officer taking training at Fort Sill, Okla., brought several of these plants home. One he gave to his mother who planted it in her rockery. His plants were kept in a pot in the yard, where they took the weather summer and winter as it came. He told me I could have his plants because his wife didn't like them, but I didn't believe they were cacti, so they stayed in his yard five years before I went after them, flowering every year. I have had them over two years and they have flowered each spring.

Echinopsis haven't done very well for me in spite of the fact that I have some healthy mature plants.

Our seasons vary so much and cacti are so dependent on sun and sun heat that the flowering seasons vary a great deal from year to year. Last fall was warm and sunny so late, and the last two months have been rainy or cloudy and the plants that are either budded or in flower by this time are still dormant. I'm not hurrying them because I know that they will come along rapidly as soon as we get some real sunny weather. I still like the box idea as the cleanest and easiest way of caring for them in the house.

The plants kept in an unheated room have been given no water for two months.

I don't see why people have so much trouble with *Zygocactus* and *Epiphyllums*. I plant them in leaf mold and cow manure (rotted). If I suspect worms I saturate the soil with a solution of "slug shot." I believe this is the same spray that is sold as "Red Arrow" in California. During the cold months they are kept in the house in a south window, in a room where the temperature ranges between 45 and 65°. After the buds start I fertilize weekly with "vigor," a teaspoon to a quart of warm water and I spray the tops often enough to keep them clean. They are rested after blooming and again in the fall before they bud. During the warm months they are kept outside where they get some morning and late afternoon sun. I give just as much sun as they will stand without burning them. My plants make a vigorous and healthy growth and I wish I had room for more of this type.

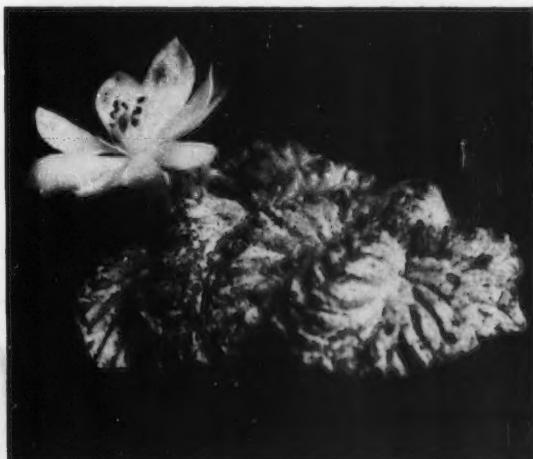
I believe all types of succulents are stronger if left outdoors part of the year and I do wash all of my plants when they get dirty. In sections where water leaves stains I don't imagine it is advisable, but here it very definitely improves the appearance and I can't see that it does any harm, unless water is allowed to remain on them. Sun shining through a drop of water makes a bad burn and if water is allowed to remain in depressions for any length of time it causes rot.

I use a mixture of sand and leaf mold for potting, varying it to meet the requirements of the plant. I find this is the only mixture that will not pack too hard. I use a little "vigor" after growth has definitely started. Potash, by all means, should be used in sections not suitable to cactus culture as it stimulates growth of flowers and fruit. Phosphates develop root and stem growth, but I eliminate fertilizers rich in nitrogen as this is more desirable where a luxuriant leaf growth is desired. However, this is all right on epiphytes.

Lime is necessary for desert types, but it is hard to say definitely how much because soils vary so much. The best way to test the soil is to use litmus paper until an alkaline reaction shows. Our leaf mold soils here are highly acid, lime isn't suitable for epiphytes.

I have all but the first two volumes of the JOURNAL and it very definitely has been a great help and inspiration to me. And they are constantly loaned out to other interested people.

My interest started several years ago when I witnessed my first cactus, in a ten cent store. Later that year I spent 3 months in California where I made it a point to visit various nurseries, the park at Anaheim and the Huntington Estate. The Society had a wonderful display at Bullock's Store, which impressed me very much and my husband always says I came home from that trip carrying my clothes in my hand and my trunk filled with cacti. MRS. HARRY LEWIS.



Aztekium ritterii Boed. The plant pictured on the left is a section of a valuable crest in Hummel's Exotic Garden. This unusual picture shows the structure of the flower. The plant on the right was photographed by Haselton in Wm. Taylor Marshall's garden. These mature plants are about an inch in diameter. Note the relative size compared to the head of a match shown in the upper part of the picture on the right. A close-up of a plant is shown on page 444, CACTUS JOURNAL, Vol. V, No. 3.

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MY TEN FAVORITE SUCCULENTS

Though my collection is not large and there are a great many varieties I have not yet seen, I find some favorites among my plants:

Of all the succulents, I'm sure I admire *Haworthias* the most, and have yet to see one I would not like in my collection.

Ariocarpus fissuratus is very odd and always attracts attention from visitors. Reliable October bloomer here.

Myrtillocactus geometrizans—so smooth and blue.

Mammillaria prolifera is one of the few that blooms and sets red seed pods in the window, during winter here in southern Iowa.

Cephalocereus senilis—wanted by everyone.

Astrophytum ornatum—truly and beautifully ornamented.

Byrnesia weinbergii (now *Graptopetalum paraguayense*) is still the same reliable "Ghost Plant," so easily propagated from a mere leaf.

Neobesseyea missouriensis — attractive and hardy here, soon growing into a nice clump.

Echinocereus reichenbachii stands so sturdily with depressed spines and lovely flowers.

Opuntia monocantha variegata—Though I do not care too much for the poisonous barbed spines of this group, the marbled pads of this one are very lovely. MRS. FORREST HUSS, Iowa.

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LAST CALL FOR B.F.K.

Only two or three members have requested that the B.F.K. be continued. Unless a sufficient member express their willingness to cooperate, this valuable publication will be discontinued and much valuable material will be lost. Costs are \$1.68 for 1938 Bulletin. \$1.20 for the balance of 48 pages. \$2.88 for 1939. Send no money. Mail a postcard now to your Editor who will notify Mr. Backeberg.

EDITOR'S NOTE: Miss Kate Walker of Santa Barbara states, "Add my help for a 10 years subscription for the cause."

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